the stochastic case, where it leads to a bivariate Markov chain for $\{X(t), Y(t)\}$ the number of susceptibles and infectives at time $t \geq 0$.

In some epidemics, the data has been found to fit equations similar to the above, in which $\beta$ is replaced by $\beta/(x+y)^{\alpha}$ with $0 \leq \alpha \leq 1$. This leads to a bunching effect; we examine the modified model and consider some of its consequences.

**A Stochastic Model for Diffusion of an Innovation**

S. Krishnamoorthy, *Department of Mathematics, Indian Institute of Technology, Bombay, P.O. IIT, Bombay, Powai, Bombay-76, India*

Diffusion is the process by which innovation spreads and it takes place through the adoption of innovation by individuals. A number of diffusion models are available in the literature and most of them are generalisation of the classic model by Bass. Even though some researchers have pointed out the necessity of relating the adoption process with the diffusion process, no such model seems to be available. An attempt is made here in this direction. Considering the transition of individuals from one stage of adoption to the next higher stage, the diffusion process is explained through a transition matrix. A few years data will enable us to determine the transition probabilities.

**Properties of Bartoszynski's Rabies Virus Model**

A.G. Pakes, *Department of Mathematics, University of Western Australia, Australia*

The model describes the number of virus in a host by incorporating jump increments with jump rate proportional to population size, corresponding to lysis of infected cells, and exponential decline, corresponding to removal of virus by the immune system. It was subsequently shown that this set up is a special case of a CB-process, a continuous time branching process whose state space is $\mathcal{R}_+$.

Any CB-process can be obtained by a random time transformation of a Lévy process and this procedure can be carried out explicitly for the Bartoszyński process. I shall explain this construction and show how it can be used to obtain various properties of the rabies virus process.

**Some Stochastic Models for Internal Variables in an Equilibrium Birth Process**

A. Pandey, *International Institute for Population Studies, Deonar, Bombay, India*

The paper deals with some stochastic models for interval variables formed by the occurrence of births in the time segment $(T_0, T_0+T)$ in the reproductive life of a couple such that $T_0$ is a distant point since the start of the process. The results presented here are derived under the assumption that the renewal densities do

change over time because of the adoption of some contraceptives by a group of couples in the population, introduced at the start of observational period, $T_0$.

**A Doubly Stochastic Model and its Application to the Number of Births of Specific Order According to Duration of Marriage**

Prasad Akhileshwar, *Patna University, Patna, India*

Duration variables associated with many real life processes and their analytical study with the help of models can provide an interesting, fascinating and fruitful area of research. Formulation of the process in terms of relevant events and duration variables can increase our understanding of the process and may provide an useful approach to wide range of problems. A doubly stochastic process has been formulated here in terms of events and associated duration variables, namely duration between the marriage and the second birth and also duration between marriage and third birth, in a very general way within whose theoretical framework these duration variables have been studied.

**Stochastic Analysis of Particulate Systems**

R.C. Srivastava, *Department of Mathematics, Ohio State University, USA*

In the operation of the bubbling fluidized bed and pneumatic transport bed system, attrition of solid particles is frequently encountered. Consequently, the solid particles in the system experience disintegration and to a certain extent alter the hydrodynamic behaviour of the system. There are two mechanisms accounting for particle disintegration. These are the grinding mechanism and the shattering mechanism.

Deterministic and stochastic models for disintegration and random movement of particles in particulate systems will be discussed.

**Stochastic Problems in Insurance Mathematics**

J.L. Teugels, *Faculteit Wetenschappen, Departement Wiskunde, Celestijnenlaan, B-3030 Leuven, Belgium*

Nonlife insurance envisages a broad and varied set of stochastic elements, i.e. number of claims, amounts, length of time between occurrence and payment, etc. To cope with these unknowns the company uses estimation, prediction, optimization, and other classical routines from applied mathematics and statistics.

The object of the lecture is to scan the field hoping to give the audience an overall view of the impact of stochastic in insurance mathematics.